

ZABER

LSM Product
User's Manual
Firmware 5.00 and up

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Disclaimer

Zaber's devices are not intended for use in any critical medical, aviation, or military applications or situations where a product's use or failure could cause personal injury, death, or damage to property. Zaber disclaims any and all liability for injury or other damages resulting from the use of our products.

Precautions

Zaber's motion control devices are precision instruments and must be handled with care. In particular, moving parts must be treated with care. Avoid axial loads in excess of the rated thrust load, axial and radial impact, dust and other contaminants and damage to the leadscrew thread. These will reduce the performance of the device below stated specifications.

Installation

Mounting

There are several options available for mounting Zaber stages. Use the mounting holes in the bottom to mount to a surface or to another stage. You might have to move the carriage to access the bottom mounting holes. Some stages have mounting holes in the end plates for mounting vertically. Mounting screws are included with most stages.

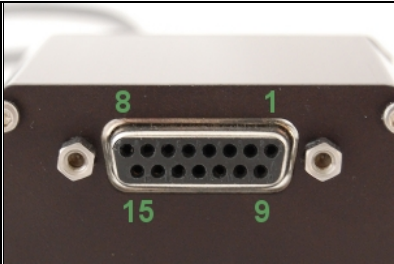
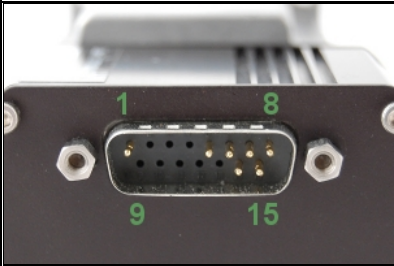
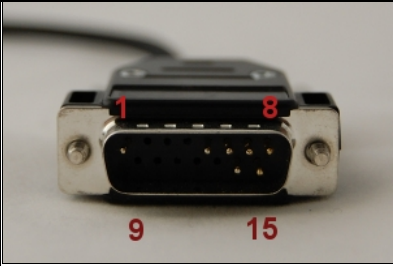
Caution: Some stages have threaded through-holes in the top mounting plate of the carriage. Be sure not to install mounting screws too deep, causing them to interfere with inside parts of the stage.

LSM stages can be mounted to a standard metric or imperial breadboard with our [AP101 adaptor plates](#).

Operation

This unit is designed to be controlled with any of Zaber's X-Series or A-Series [Stepper Motor Controllers](#). Units produced before July 2012 with the round Minidin connectors are designed to be controlled with the older [T-MCA](#) series chopper drive controllers. Zaber's controllers and peripherals are designed for ease of use when used together. Optimal settings for each peripheral (such as the default current, speed, acceleration, and limit settings) can be loaded by setting the [peripheralid](#) ([T:66](#)) on the controller. The peripheral ID is listed as the ID on the peripheral's label. A list of IDs is also available on the [ID Mapping](#) page. For more information on device operation, refer to the controller's user manual.

Pinout for D-sub 15 Connectors (A-series and X-Series controllers and peripherals)

A- or X-series controller (female)	
T3 Peripheral (male)	
T4 Peripheral (male)	

Pin #	Function
1	+5V
2	Encoder Error ****
3	<i>reserved</i>
4	Away Sensor ***
5	Home Sensor
6	Ground
7	Motor B1
8	Motor A1
9	+5V *
10	Encoder A *

11	Encoder B *
12	Encoder Index **
13	Ground *
14	Motor B2
15	Motor A2

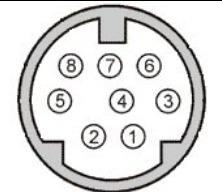

* encoder embedded peripherals only

** devices with encoders with index only

*** devices with away sensors only

**** devices with linear or direct-reading encoders only

Pin-Out for Minidin 8 (T-MCA connector and CDC6 cable to Peripheral)

Minidin 8 Female (on T-MCA)	Minidin 8 Male (on Peripheral)
	

Pin #	Function
1	Motor A1
2	Motor A2
3	Motor B1
4	Not Connected
5	Motor B2
6	+5V
7	Home Signal
8	Ground

Alternate Controllers

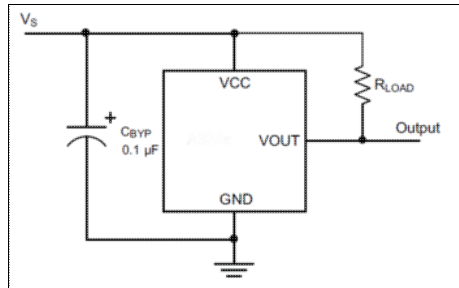
The device may be controlled by any 2-phase stepper motor controller with home sensor input. **Warning:** Operating the unit without correctly wiring up the home sensor can cause permanent damage to the unit. We do not recommend using your own controller unless you are familiar with how to control a stepper motor with a hall sensor limit switch. The following information is provided for reference only. Damage to the actuator or hall sensor due to incorrect wiring is not covered by warranty.

Home Sensor Wiring

A Hall effect sensor is mounted in the device for use as a home sensor. It is part number A1122LUA-T made by Allegro. [Click here for data sheet](#). Your controller should be configured so the stage stops immediately (little deceleration) when the home sensor is triggered.

- Wire colour code:
 - ◆ 3.6-24 Vdc input - red
 - ◆ Home signal - yellow
 - ◆ Ground - black

The Hall sensor has an open-collector output. The default output is high impedance when the Hall sensor is not active. When the sensor detects a magnet, the Hall sensor pulls the output low to ground.



If you are not using a Zaber controller, ensure that your controller has a pull-up resistor on the output line of the Hall sensor as shown in the diagram. The bypass capacitor is optional, but may help to eliminate false triggering in noisy environments. The typical value for the pull-up resistor (R_{LOAD}) is 10k and for the bypass capacitor is 0.1 μ F to 1 μ F. The larger the capacitance, the better the noise filtering but the slower the response time.

Warranty and Repair

For Zaber's policies on warranty and repair, please refer to the [Ordering Policies](#)

Standard products

Standard products are any part numbers that do not contain the suffix ENG followed by a 4 digit number. Most, but not all, standard products are listed for sale on our website. All standard Zaber products are backed by a one-month satisfaction guarantee. If you are not satisfied with your purchase, we will refund your payment minus any shipping charges. Goods must be in brand new saleable condition with no marks. Zaber products are guaranteed for one year. During this period Zaber will repair any products with faults due to manufacturing defects, free of charge.

Custom products

Custom products are any part numbers containing the suffix ENG followed by a 4 digit number. Each of these products has been designed for a custom application for a particular customer. Custom products are guaranteed for one year, unless explicitly stated otherwise. During this period Zaber will repair any products with faults due to manufacturing defects, free of charge.

How to return products

Customers with devices in need of return or repair should contact Zaber to obtain an RMA form which must be filled out and sent back to us to receive an RMA number. The RMA form contains instructions for packing and returning the device. The specified RMA number must be included on the shipment to ensure timely processing.

Email Updates

If you would like to receive our periodic email newsletter including product updates and promotions, please sign up online at www.zaber.com ([news section](#)). Newsletters typically include a promotional offer worth at least \$100.

Contact Information

Contact Zaber Technologies Inc by any of the following methods:

Phone	1-604-569-3780 (direct) 1-888-276-8033 (toll free in North America)
Fax	1-604-648-8033
Mail	#2 - 605 West Kent Ave. N., Vancouver, British Columbia, Canada, V6P 6T7
Web	www.zaber.com
Email	Please visit our website for up to date email contact information.

The original instructions for this product are available at <http://www.zaber.com/wiki/Manuals/LSM>.

Specification	Value	Alternate Unit
<u>Integrated Controller</u>	No	
<u>Recommended Controller</u>	<u>X-MCB1</u> (24 V) Recommended	
<u>Minimum Speed</u>	0.00000727 mm/s	0.00000 "/s
<u>Speed Resolution</u>	0.00000727 mm/s	0.00000 "/s
<u>Encoder Type</u>	None	
<u>Maximum Continuous Thrust</u>	25 N	5.6 lb
<u>Maximum Centered Load</u>	100 N	22.4 lb
<u>Maximum Cantilever Load</u>	300 N-cm	424.8 oz-in
<u>Guide Type</u>	Needle roller bearing	
<u>Vertical Runout</u>	< 8 μ m	< 0.000315 "
<u>Horizontal Runout</u>	< 12 μ m	< 0.000472 "
<u>Motor Steps Per Rev</u>	200	
<u>Motor Type</u>	Stepper (2 phase)	
<u>Motor Rated Current</u>	600 mA/phase	
<u>Motor Winding Resistance</u>	6.5 ohms/phase	
<u>Inductance</u>	3.5 mH/phase	
<u>Motor Rated Power</u>	6.9 Watts	
<u>Motor Rotor Inertia</u>	2.9 g-cm ²	
<u>Motor Connection</u>	D-sub 15	
<u>Motor Frame Size</u>	NEMA 08	
<u>Mechanical Drive System</u>	Precision lead screw	
<u>Limit or Home Sensing</u>	Magnetic hall sensor	
<u>Axes of Motion</u>	1	
<u>Mounting Interface</u>	M3 and M6 threaded holes and M4 threaded center hole	
<u>Operating Temperature Range</u>	0 to 50 degrees C	
<u>Stage Parallelism</u>	< 25 μ m	< 0.000984 "
<u>RoHS Compliant</u>	Yes	
<u>CE Compliant</u>	Yes	

Comparison - LSM Series

Part Number	Microstep Size (Default Resolution)	Travel Range	Accuracy (unidirectional)	Repeatability
<u>LSM025A-T4</u>	0.047625 μm	25.4 mm (1.000 ")	8 μm (0.000315 ")	< 1 μm (< 0.000039 ")
<u>LSM025B-T4</u>	0.1905 μm	25.4 mm (1.000 ")	8 μm (0.000315 ")	< 4 μm (< 0.000157 ")
<u>LSM050A-T4</u>	0.047625 μm	50.8 mm (2.000 ")	15 μm (0.000591 ")	< 1 μm (< 0.000039 ")
<u>LSM050B-T4</u>	0.1905 μm	50.8 mm (2.000 ")	15 μm (0.000591 ")	< 4 μm (< 0.000157 ")
<u>LSM100A-T4</u>	0.047625 μm	101.6 mm (4.000 ")	30 μm (0.001181 ")	< 1 μm (< 0.000039 ")
<u>LSM100B-T4</u>	0.1905 μm	101.6 mm (4.000 ")	30 μm (0.001181 ")	< 4 μm (< 0.000157 ")
<u>LSM150A-T4</u>	0.047625 μm	152.4 mm (6.000 ")	46 μm (0.001811 ")	< 1 μm (< 0.000039 ")
<u>LSM150B-T4</u>	0.1905 μm	152.4 mm (6.000 ")	46 μm (0.001811 ")	< 4 μm (< 0.000157 ")
<u>LSM200A-T4</u>	0.047625 μm	203.2 mm (8.000 ")	61 μm (0.002402 ")	< 1 μm (< 0.000039 ")
<u>LSM200B-T4</u>	0.1905 μm	203.2 mm (8.000 ")	61 μm (0.002402 ")	< 4 μm (< 0.000157 ")

Part Number	Backlash	Maximum Speed	Peak Thrust	Pitch
<u>LSM025A-T4</u>	< 3 μm (< 0.000118 ")	26 mm/s (1.024 "/s)	45 N (10.1 lb)	0.02 degrees (0.349 mrad)
<u>LSM025B-T4</u>	< 13 μm (< 0.000512 ")	104 mm/s (4.094 "/s)	25 N (5.6 lb)	0.02 degrees (0.349 mrad)
<u>LSM050A-T4</u>	< 3 μm (< 0.000118 ")	26 mm/s (1.024 "/s)	45 N (10.1 lb)	0.02 degrees (0.349 mrad)
<u>LSM050B-T4</u>	< 13 μm (< 0.000512 ")	104 mm/s (4.094 "/s)	25 N (5.6 lb)	0.02 degrees (0.349 mrad)

<u>LSM100A-T4</u>	< 3 µm (< 0.000118 ")	26 mm/s (1.024 "/s)	45 N (10.1 lb)	0.04 degrees (0.698 mrad)
<u>LSM100B-T4</u>	< 13 µm (< 0.000512 ")	104 mm/s (4.094 "/s)	25 N (5.6 lb)	0.04 degrees (0.698 mrad)
<u>LSM150A-T4</u>	< 3 µm (< 0.000118 ")	26 mm/s (1.024 "/s)	45 N (10.1 lb)	0.04 degrees (0.698 mrad)
<u>LSM150B-T4</u>	< 13 µm (< 0.000512 ")	104 mm/s (4.094 "/s)	25 N (5.6 lb)	0.04 degrees (0.698 mrad)
<u>LSM200A-T4</u>	< 3 µm (< 0.000118 ")	26 mm/s (1.024 "/s)	45 N (10.1 lb)	0.04 degrees (0.698 mrad)
<u>LSM200B-T4</u>	< 13 µm (< 0.000512 ")	104 mm/s (4.094 "/s)	25 N (5.6 lb)	0.04 degrees (0.698 mrad)

Part Number	Roll	Yaw	Linear Motion Per Motor Rev	Weight
<u>LSM025A-T4</u>	0.005 degrees (0.087 mrad)	0.02 degrees (0.349 mrad)	0.6096 mm (0.024 ")	0.2 kg
<u>LSM025B-T4</u>	0.005 degrees (0.087 mrad)	0.02 degrees (0.349 mrad)	2.4384 mm (0.096 ")	0.2 kg
<u>LSM050A-T4</u>	0.005 degrees (0.087 mrad)	0.02 degrees (0.349 mrad)	0.6096 mm (0.024 ")	0.21 kg
<u>LSM050B-T4</u>	0.005 degrees (0.087 mrad)	0.02 degrees (0.349 mrad)	2.4384 mm (0.096 ")	0.21 kg
<u>LSM100A-T4</u>	0.02 degrees (0.349 mrad)	0.03 degrees (0.524 mrad)	0.6096 mm (0.024 ")	0.24 kg
<u>LSM100B-T4</u>	0.02 degrees (0.349 mrad)	0.03 degrees (0.524 mrad)	2.4384 mm (0.096 ")	0.24 kg
<u>LSM150A-T4</u>	0.02 degrees (0.349 mrad)	0.03 degrees (0.524 mrad)	0.6096 mm (0.024 ")	0.28 kg
<u>LSM150B-T4</u>	0.02 degrees (0.349 mrad)	0.03 degrees (0.524 mrad)	2.4384 mm (0.096 ")	0.28 kg
<u>LSM200A-T4</u>	0.02 degrees (0.349 mrad)	0.03 degrees (0.524 mrad)	0.6096 mm (0.024 ")	0.31 kg
<u>LSM200B-T4</u>				0.31 kg

0.02 degrees	0.03 degrees	2.4384 mm
(0.349 mrad)	(0.524 mrad)	(0.096 ")